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THE UNIVERSITY OF ALBERTA

"AN EXAMINATION INTO THE RELATIONSHIP BETWEEN TRAIT ANXIETY AND STRUCTURED PHYSICAL ACTIVITY."

BY

© WILLIAM F. DOWBIGGIN

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

DEPARTMENT OF PHYSICAL EDUCATION

EDMONTON, ALBERTA

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FACULTY OF GRADUATE STUDIES AND RESEARCH

THE UNDERSIGNED CERTIFY THAT THEY HAVE READ, AND RECOMMEND TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH, FOR ACCEPTANCE, A THESIS ENTITLED ....."AN EXAMINATION INTO THE RELATIONSHIP BETWEEN TRAIT ANXIETY AND STRUCTURED PHYSICAL ACTIVITY".... SUBMITTED BY ..... WILLIAM F. DOWBIGGIN IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF ARTS IN DEPARTMENT OF PHYSICAL EDUCATION.

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CHAIRMAN

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DATE May 13, 1975

A B S T R A C T

The purpose of this study was to examine the relationship between trait anxiety and structured physical activity. A sample of one hundred and thirty eight students and athletes from the total population of the University of Alberta winter session 1974, were tested twice by means of a trait anxiety questionnaire. This questionnaire was constructed from three highly validated trait anxiety inventories.

Immediately following the second testing session (two weeks after the initial testing session) the subjects completed a personal data sheet, a self-report sheet with categories for age, sex, athletic participation both past and present, and physical activity in hours per week, also both past and present.

Standard statistical procedures were performed and differences in trait anxiety as functions of amounts of structured physical activity engaged in, age, and sex, were all found to be non-significant. It was concluded that further research in this area is needed before any definite statements about the relationship between trait anxiety and structured physical activity can be made.

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The students and athletes that cooperated with the study.

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CHAPTER ONE

INTRODUCTION

Of particular interest to people concerned with the psychological effects of the intensive, highly structured, physical training that athletes normally undergo, is a recent study by Hahner and Rochelle (1968), in which the relationship between autonomic nervous system (A.N.S.) activity and the training levels of certain selected athletes and non-athletes was studied. The findings of this study indicated that the more intensive and structured the training, the higher the degree of autonomic balance, and possibly, it could be conjectured, the greater the degree of emotional stability. Autonomic balance, in this sense, is usually considered to represent a consistency of A.N.S. activity. The athletes in the above study, for example showed consistent "parasympathetic" nervous system activity, whereas the non-athletes displayed significant fluctuations in both sympathetic and parasympathetic activity. The possible implications of these findings could indicate that the highly structured physical activity training programs that competitive athletes are normally exposed to have a significant effect on the balancing of the autonomic nervous system.

If this in fact is true, and a reasonable case can be made in linking up the A.N.S. activity to a person's customary level of anxiety, then one could speculate either that highly structured physical activity tends to reduce the anxiety levels of athletes in training or that low anxiety levels may be a selective factor in determining whether or not a person is attracted to sports requiring rigid schedules of practice and training.

The general intent of this study then was to explore such speculations by examining the trait anxiety levels of athletes in certain selected sports requiring such structured physical training schedules.

The initial work in several studies by Wenger (1941, 1942, 1948) established that autonomic balance was significantly correlated to neuroticism measures in not only operationally fatigued pilots, but in ordinary children and Army Air Force cadets as well. Of particular interest at this time was the finding that some of his neurotic subjects exhibited a predominance of parasympathetic activity whereas others showed an imbalance toward sympathetic activity. Wenger hypothesized that neuroticism was correlated with the "deviation" from autonomic balance in "either direction" with introversion and extraversion being simply related to the direction of that deviation.

Hans Eysenck (1968, 1970) also believes that people differ (though on a hereditary basis), due to the reactivity of their nervous systems and in the speed and strength with which they develop conditioned responses. He associates these individual differences with two pervasive personality-dimensions designated "Extraversion - Introversion" and "Neuroticism - Stability". He theorizes that some individuals are constitutionally predisposed to develop neurotic anxiety, however all neurotic behavior and anxiety is seen as being learned. Eysenck's theory states that individuals with "excitable" autonomic nervous systems will react sooner and stronger to conditioning stimuli, and thereby have the capacity for developing neuroses more easily than individuals with stable autonomic nervous systems.

Research in the area of physical activity and its relationship with anxiety has been rather scarce and mainly confined to studies on psychiatric patients. Hodgden and Reimer (1960), in an exploratory study, tested a randomly selected group of male psychiatric patients with the Rogers P.F.I. The scores ranged from a low of 44.4 to a high of 140 with a mean of 70.6. Since the mean for a normal population is 100 Hodgdon and Reimer concluded that there may be a negative relationship between an individual's strength and endurance and the presence of mental illness. Hammett (1967), in a review of several studies gives two examples of relationships between anxiety and physical fitness.

> 1. Dynamic strength as measured by the number of "dips" correlates with ..... less anxiety and less tension.
>
> 2. A high score on the Schneider Index of Physical Fitness correlates with .... less overall anxiety.
>
> (p. 266)

Morgan (1969) reports comparing the medical records of psychiatric patients from a previous study done a year earlier. Morgan concluded that the psychiatric patients length of hospitalization was governed to a certain degree by his muscular fitness at the time of admission.

NEED FOR THE STUDY:

It would appear, then, from the brief foregoing overview of some of the relevant literature in this area that:

1. Imbalance in the autonomic nervous system is related to neuroticism.
2. Physical training can be seen as one means of "toning" or conditioning the autonomic nervous system (i.e. attaining better "autonomic balance").

3. A general relationship can be seen between various kinds of neuroses and a lack of physical fitness in psychiatric patients.

The direction of these findings, coupled with the already established view that outstanding competitive athletes tend to exhibit high levels of emotional stability (Kane and Warburton, 1966, p. 80), would tend to indicate that possibly a strong link exists between the absence or reduction of anxiety and the rigid, intensive training regimens of athletes. If this is so, then information concerning the general anxiety levels of top calibre athletes, involved in such training regimens, would be a valuable adjunct to not only the training literature in sport, but also for the psychological/medical literature dealing with anxiety related disfunctions and programs designed to alleviate them.

THE PROBLEM:

The purpose of this study was to investigate whether or not a significant relationship exists between a person's anxiety level and the amount of highly structured physical activity he engages in. The main intention was to explore the possibility that people who engage in high amounts of structured physical activity (e.g. competitive athletes) will, in fact, have lower levels of anxiety than those who do not and that, possibly, the latter is an effect of the former.

SUBSIDIARY PROBLEMS:

In addition to the central purpose of this study are two other subproblems:

1. To determine whether or not the relationship between anxiety level and amount of structured physical activity is influenced by age differences.

2. To determine whether or not the relationship between anxiety level and amount of structured physical activity is influenced by sex differences.

HYPOTHESES:

The following null hypotheses were tested in this study:

1. There is no difference in anxiety levels between individuals who differ in amounts of structured physical activity.

2. There is no difference in anxiety levels between individuals of differing ages as a function of the amount of structured physical activity they engage in.

3. There is no difference in anxiety levels between male and females as a function of the amount of structured physical activity they engage in.

DELIMITATIONS:

This study was limited by the investigator in the following ways:

1. Only 138 students of the total active population of the University of Alberta student enrollment were used as subjects.

2. Only three of the major instruments for measuring anxiety in normal individuals were used, i.e. the Institute for Personality and Ability testing (IPAT) self analysis form, the Eysenck Personality Inventory (EPI) and the Speilberger State-Trait Anxiety Inventory (STAI).

3. Subjects were tested on only two separate occasions.

DEFINITION OF TERMS:

Anxiety: All three inventories purport to measure what is commonly accepted as a "second order personality factor" of anxiety. The IPAT defines this anxiety factor as "a definite, replicable, unique, second order factor.... which tends to agree with the central tendency in anxiety rating among psychiatrists. That is, it tends to rank patients in the same order as psychiatric interviews by good diagnosticians.

(p. 6)

The EPI manual defines high scores on this factor as:

"Indicative of emotional lability and overactivity. High scoring individuals tend to be emotionally over responsive and to have difficulties in returning to a normal state after emotional experiences... such individuals are predisposed to develop neurotic disorders under stress."

(p. 6)

The STAI manual defines trait anxiety as:

"Trait anxiety (A-trait) refers to relatively stable individual differences in anxiety proneness, that is to differences between people in the tendency to respond to situations perceived as threatening with elevations in A-state intensity.

(p. 3)

STRUCTURED PHYSICAL ACTIVITY:

Structured physical activity was seen as the daily physical activity engaged in by individuals who regularly train within a rigid, scheduled regimen. (If done regularly and consistently as little as one hour a day was considered to fit this definition).

AUTONOMIC NERVOUS SYSTEM: D.O. HEBB (1972) describes ANS as:

"a primative, though still complex, set of motor pathways to smooth muscle and glands.... The ANS is made up of two sub systems, the sympathetic and the parasympathetic.... Sympathetic and parasympathetic systems are in general opposed to each other....The sympathetic is regarded as designed for action in emergency situations, mobilizing the resources of the body for maximal expenditure - a spend thrift, while the parasympathetic is the skinflint that builds them up and conserves them."

(p. 179 - 180)

CHAPTER TWO

REVIEW OF LITERATURE

1. GENERAL ANXIETY THEORY:

Freud (1936) was the first psychologist to view anxiety as a fundamental and significant problem. Although much of his work is now believed to need qualification and reinterpretation, its importance cannot be overemphasized. Freud's initial theory of anxiety was that when the libido (instinctual energy) is repressed it becomes transformed into anxiety and reappears as an anxiety equivalent or symptom. Freud analyzed the anxiety state and described it as having three basic attributes : (I) a specific character of unpleasure, (2) acts of discharge and (3) perceptions of these acts. (Freud 1959 p. 33).

Freud believed that the capacity for anxiety is innate in everyone, that it is a part of the self-preservation instinct, and that it is phylogenetically inherited. The specific forms this innate anxiety takes are due to learning.

Freud classified anxiety as primary anxiety and subsequent or secondary anxiety. Primary anxiety was the prototype for all subsequent anxitey and was caused by birth trauma. Subsequent anxiety occasions signify the fear of premature loss of or separation from the mother or her love (May 1950, p. 123).

Freud's final hypothesis of anxiety was totally different from his

first. Where before he believed repression caused anxiety he now theorized it to be the cause of repression. He hypothesized the ego perceiving some danger and the perception thus arousing anxiety. In an endeavor to avoid the anxiety which is unpleasurable, the ego effects the repression of the impulses and desires which would lead the individual into danger.

Where Freud used clinical and personal observations in formulating his theories on anxiety, behaviorist psychologists have devised their stimulus - response theories of anxiety through laboratory tests. Ivan Pavlov, a Russian physiologist, started this school of psychological research by conditioning dogs to salivate to the ringing of a buzzer. Pavlov accidentally discovered that anxiety and neuroses could be conditioned also (Pavlov, 1927). In an experiment where he was attempting to find out how well dogs could discriminate, Pavlov rewarded the dogs for choosing a circle over an elipse. As the difference between the circles and the elipses grew small the dog suddenly lost the ability to discriminate (which it had developed to a high degree) and began to react violently and neurotically when ever it was brought into the laboratory setting. The dog had learned to be anxious in this setting.

Dollard and Miller (1950) in various studies with animals elaborated on Hall's Drive Theory of learning. Dollard and Miller thought that if not equatable to fear anxiety is, at least, a particular form of fear. Miller (1948) stated that fear (or anxiety) plays a leading role in the production of all behavior and especially neurotic behavior. To prove this Miller showed that, anxious rats would pull away from a fearful

compartment with four times the force starved rats would pull towards food.

In another study, Dollard and Miller, (1950) taught rats to fear a white compartment and seek refuge in a black compartment. This was accomplished by repeatedly shocking rats while in the white compartment. Later when the rats were put into this white compartment with no refuge available, the rats exhibited neurotic behavior even though they no longer were being shocked. In the second part of this experiment, Dollard and Miller, allowed exit to the black compartment if the rats moved a wheel in the white compartment. The rats subsequently learnt to move the wheel quite quickly.

Hans Selye, (1956) a noted world authority on stress, after extensive research has proposed that stress is the cause of the degenerative diseases and aging of man. Although he is generally talking about physiological aspects he makes it quite clear that stress can be understood in psychological terms also. The effect of psychological stress being the same as physiological stress (Selye, p. 263). In this sense an individual undergoing either kind of stress will activate a general adaptation syndrome including such reactions as adrenal stimulation, shrinkage of the lymphatic organs, and a general increase in the "wear and tear" on the body. Martens (1971) suggest that psychological stress is basically state anxiety. Thus if an individual who is chronically exposed to stress, has high trait anxiety (and so responds strongly), he will unfortunately be the victim of a great deal of "wear and tear" and age much more rapidly than need be.

R.B. Cattell, (1965) a well known psychologist, factor analysed over four thousand items pertaining to anxiety. Starting with over 171 trait names Cattell arrived at sixteen personality traits of the first order. Six of these traits clustered together in a second factor analysis to form a second order personality dimension of anxiety that is essentially the same as Eysenck's Neuroticism - Stability dimension (Eysenck 1968). Cattell hypothesized that anxiety is a function of uncertainty of reward. He believed the six traits he found loading together to form the anxiety dimension tended to confirm some of the psychoanalytic (Freudian) theories of anxiety (Cattell 1965, p. 118). Cattell also found muscular efficiency, in general, is significantly lower in the more anxious person and that anxiety is higher in neurotics, as believed, but not in psychotics as hypothesized by Freud.

Speilberger (1966) has recently theorized anxiety as a dichotomous variable having both state and trait aspects. Speilberger conceptualizes state anxiety (A-state) as a transitory emotional state or condition that can be characterized by perceived tension and apprehension along with increases in autonomic nervous system activity. Trait anxiety (A-trait) is conceptualized as a relatively stable, individual proneness to anxiety. Speilberger describes state and trait anxiety as analogous to kinetic and potential energy and states that his trait anxiety is similar to Cattell's 2nd order personality trait of anxiety (Speilberger 1970).

2. ANXIETY RESEARCH IN SPORT:

Johnson and Hutton (1954) using two projective tests measured personality traits of some champion athletes. Qualified evaluators

doing the evaluations without knowledge of the subjects found the outstanding athletes to possess a number of distinguishing characteristics including high and generalized anxiety. Booth (1958) tested freshman athletes, freshman non-athletes, upperclass athletes and upperclass non-athletes with the Minnesota Multiphasic Personality Inventory (MMPI). Booth found the upperclass athletes to score significantly lower on the anxiety variable than the other three groups. The freshman athletes being basically the same as non-athletes.

Kroll (1967) found similar differences between a study by Slusher (1964) on high school students and his own study on college athletes and students. Slusher's study on selected high school athletes, including wrestlers found them to have relatively high levels of anxiety whereas Kroll's study of college wrestlers found them to have low levels of anxiety. Kroll explained the inconsistent results in terms of maturity and suggested these results might be evidence of a very desirable outcome upon personality from participation in wrestling.

Hammer (1967), in a study involving high and low achievers in wrestling, football and non-athletes used manifest anxiety as a measure. He found that the high achieving wrestlers were significantly lower in trait anxiety while the low achieving wrestlers and football players were basically the same as non-athletes. Black (1961) gave the M.M.P.I. to college female students. The women were divided into fifteen groups according to behavioristic characteristics. The "most athletic" group showed more consistent differences from the rest of the women students than any other group. Among these differences was low anxiety. The athletic girls showed such internal group consistency that Black suggested there was a possibility of a female sport type.

Finally Breen[1] tested a mixture of subjects from the general college population and physical education majors. Breen found anxiety and in particular factors O (anxious insecurity), Q4 (nervous tension) and C- (instability) were found to be consistently related to high pulse rate, high systolic and diatolic amplitude and to distolic surge. Breen reasoned that poor physical condition seems to be connected with anxiety.

3. AUTONOMIC NERVOUS SYSTEM RESEARCH:

In Hahner and Rochelle's (1968) study, three groups were compared in A.N.S. activity. The first group, comprised of normal college students had no significant differences from a second group of field athletes from the college track team. The third group consisting of runners from the track team showed significant differences from the normal student group. From measurements of six autonomic activity areas it was found that:

(1) the runners showed significantly higher (at the .05 level of confidence) mean autonomic balance scores,

(2) the pattern of the runner's resting A.N.S. scores did not demonstrate the same random deviations from the mean as did the normals,

(3) the runner's scores fell near the mean or deviated to the parasympathetic side. It was also noted that the most successful athletes demonstrated the highest autonomic balance.

1. Reported in Kane Warburton, Readings in Physical Education The Physical Education association 1966, p.76 .

The authors reasoned that either autonomic balance influenced by the degree of physical conditioning or that it is a measure of inherent characteristics possessed by successful runners.

In a collateral study, measures of palmar skin resistance (PSR) during muscular strain of one minutes' duration were taken. A significant difference at the .05 level was found between the runners and the normals with the runners' PSR not dropping as far or as quickly as that of the normals. Hahner and Rochelle stated that their study indicated the athlete is parasympathetically dominant at rest, but that the PSR measurements during strain indicates that he is capable of sympathetic excitement much greater than the average person. The authors suggest that both branches of the A.N.S. are toned or conditioned by the strenuous, long term training of runners. Parasympathetic conditioning being demonstrated at rest while sympathetic toneness is dominant during exercise.

Cureton (1960), in research on physiological and psychological changes induced by exercise programs in adults found similar results. Cureton concluded that training reduces anxiety in that higher sympathetic tone is developed during exercise and high vagus tone during rest causing parasympathetic nervous tendencies to be reduced.

In Wenger's (1941, 1942, 1948) studies on the relationship between the A.N.S. and anxiety he found autonomic balance to be normally distributed through out the population. Wenger hypothesized that extreme sympathetic predominance was associated with neuroticism and introversion,

while extreme parasympathetic dominance was related to extraversion and neuroticism. He reasoned that Autonomic balance was thereby related to stability. Eysenck (1968) interprets Wenger's findings differently. Although Eysenck agrees with Wenger's conclusion that parasympathetic dominance is associated with extraversion and introversion with sympathetic predominance he disagrees with the relationship between autonomic balance and neuroticism. Eysenck believes it is not the imbalance in either extreme being related with neuroticism but simply sympathetic predominance. Eysenck, however, is not sure whether the stable personality would be someone having no autonomic imbalance either way or the person having parasympathetic predominance. Hahner and Rochelle cite Wenger as stating that physical training would move an individuals autonomic balance toward the mean or toward parasympathetic balance at rest and described such A.N.S. changes as a shifting along a sympathetic-parasympathetic continuum. If this is true then it would seem that according to either Wenger's or Eysenck's interpretations physical training should move the individual towards greater stability.

CHAPTER THREE

METHODS AND PROCEDURES

SUBJECTS:

Two hundred and twenty-eight students from five courses in the Department of Physical Education and nine intercollegiate athletic teams at the University of Alberta were included in the first testing session. Subject attrition was caused by inattendance at the second testing session or a high score on the Lie scale of the E.P.I. This resulted in the loss of sixty-eight and twenty-two subjects respectively. Of the remaining one hundred and thirty eight subjects, ninety were male and forty-eight female.

INSTRUMENTS:

A. A trait anxiety questionnarie, consisting of 117 items was made up from the following anxiety inventories:

1. The I.P.A.T. Self Analysis Form: Also known as the I.P.A.T. Anxiety Scale. This scale is an inventory published by the Institute for Personality and Ability Testing, consisting of forty questions, which measure anxiety as a second-order personality factor.
2. The E.P.I. Neuroticism Scale: The Eysenck Personality Inventory measures personality in terms of two independent dimensions. The neuroticism-stability dimension, which was the dimension used in this study, consists of twenty-four questions selected on the basis of item and factor analysis. A response distortion ("Lie Scale") scale is also included to detect any invalid response sets.

3. The Speilberger S.T.A.I. Trait Anxiety Form: The State-Trait Anxiety Inventory consists of two scales, each consisting of twenty questions. The A-trait scale was used in this study in order to provide a third inventory measuring second order anxiety. The A-state scale was not used.

B. THE PERSONAL DATA SHEET:

A self-report sheet, with categories for age, sex, athletic participation both past and present, and physical activity in hours per week, also both past and present, was used to determine the physical activity structure of the subjects.

PROCEDURES:

The trait anxiety questionnaire was administered in two testing sessions two weeks apart in order to determine test-retest reliability. The questionnaire was administered in either classroom or athletic practice settings. After completion of the second session the subjects filled out the personal data sheet.

CHAPTER FOUR

RESULTS AND DISCUSSION

A. PROBABILITY LEVELS:

For all statistical analyses the probability level was at the five per cent level of confidence for a two tailed test.

B. RESULTS:

The main intent of this study was to test the null hypothesis that there is no difference in trait anxiety between individuals who have high levels of structured physical activity (or training) and those who do not. The reviewed literature hypothesized a relationship between anxiety and the A.N.S. (Wenger), and of a link between strenuous and structured physical activity and the A.N.S. (Hahner and Rochelle) suggested that such differences may exist. Tables I and II show the means and standard deviations of the trait anxiety scores on three separate tests for males and females respectively for all training levels.

TABLE 1

Means and Standard Deviations for All Training Levels of Males on Three Measures of Trait Anxiety.

Measure →	IPAT		EPI		STAI	
Group ↓	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
1-5 hrs/wk	145.63	15.76	19.42	8.70	72.21	14.08
6-10 hrs/wk	143.20	15.36	17.65	8.00	74.60	13.88
11-15 hrs/wk	145.53	15.29	18.88	8.29	74.16	13.99
16-20 hrs/wk	135.54	16.58	20.54	8.72	69.69	29.01
20 + hrs/wk	136.67	17.67	16.00	7.56	64.83	15.06

TABLE II

Means and Standard Deviations for All Training Levels of Females on Three Measures of Trait Anxiety.

Measure →	IPAT		EPI		STAI	
Group ↓	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
1-5 hrs/wk	153.00	14.58	22.44	8.80	84.22	16.07
6-10 hrs/wk	145.50	15.89	20.30	9.68	72.30	13.43
11-15 hrs/wk	146.20	21.37	21.00	9.55	77.50	19.44

Tables III and IV show the results of analyses of variance for the data from tables I and II respectively. No significant differences were found between either the five male groups or the three female groups.

TABLE III

One Way Analysis of Variance Between the Five Male Groups on

(a) IPAT scores
(b) EPI scores
(c) STAI scores.

(a) I.P.A.T.

Source of Variation	Sums of Squares	Degrees of Freedom	Mean Squares	F Value
Between Groups	1301.0	4	325.25	1.31
Within Groups	21080.0	85	248.00	

(b) E.P.I.

Source of Variation	Sums of Squares	Degrees of Freedom	Mean Squares	F Value
Between Groups	120.18359	4	30.045898	0.43
Within Groups	5909.9180	85	69.528442	

(c) S.T.A.I.

Source of Variation	Sums of Squares	Degrees of Freedom	Mean Squares	F Value
Between Groups	632.06250	4	158.01563	0.55
Within Groups	24545.938	85	288.77564	

F of 2.48 needed for Significance.

TABLE IV

One Way Analysis of Variance Between the Three Female Groups on

(a) I.P.A.T. scores
(b) E.P.I. scores
(c) S.T.A.I. scores

(a) I.P.A.T.

Sources of Variation	Sums of Squares	Degrees of Freedom	Mean Squares	F Value
Between Groups	597.000	2	298.50000	1.07
Within Groups	12531.00	45	278.46655	

(b) E.P.I.

Source of Variation	Sums of Squares	Degrees of Freedom	Mean Squares	F Value
Between Groups	44.351563	2	22.175781	0.25
Within Groups	3922.6484	45	87.169952	

(c) S.T.A.I.

Source of Variation	Sums of Squares	Degrees of Freedom	Mean Squares	F Value
Between Groups	1348.1250	2	674.06250	2.70
Within Groups	11225.875	45	249.46388	

F of 3.20 needed for significance.

A further test of the first null hypothesis is shown in Table V where a low training group of males, engaging in less than six hours of structured physical activity per week was compared with a high training group of males who engaged in fifteen or more hours per week of structured physical activity. A T-test of significant differences between means

resulted in non-significance in all three measures of trait anxiety. Therefore, the null hypothesis which stated taht there would be no differences in the trait anxiety levels of individuals engaged in highly structured physical activity programs and those of individuals engaged in low structured physical activity programs was not rejected.

TABLE V

T-test for Significance of Differences Between Means of Low Training Males and High Training Males.

Measure →	IPAT		E.P.I.		S.T.A.I.	
Group ↓	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Under 6 hrs. per week	145.63	15.76	19.42	8.70	72.21	14.08
Over 15 hrs. per week	136.32	16.21	19.10	8.44	66.58	15.99
Mean Diff.	9.3158		0.3159		5.1053	
t =	1.7704		0.1135		1.0283	

A t-value of 2.021 needed for significance

The second null hypothesis tested by this study was that there would be no differences in trait anxiety as a function of age. According to Cattell (1963) an individual's anxiety level is highest during adolescence,

drops sharply at the end of his teens, stabilizes between twenty and twenty five and finally begins to rise again after fifty five years of age. To test this hypothesis three groups of (a) nineteen years old and under, (b) twenty to twenty four years old and (c) twenty five years old and over were analyzed by a one way analysis of variance (Table VI). No significance was attained and so the null hypothesis of no differences in anxiety due to age was not rejected.

TABLE VI

One-way Analysis of Variance Between Three Age Groups:

(i) 19 yrs old and under
(ii) 20 - 24 yrs. old
(iii) 25 and over yrs. old

Source of Variation	Sums of Squares	Degrees of Freedom	Mean Squares	F Values
Between Groups	790.96387	2	395.48193	0.55391
Within Groups	589033.50	825	713,97998	

An F of 3.00 needed for Significance.

The third null hypothesis to be tested in this study was that there would be no differences in trait anxiety as a function of sex. Such a difference would be expected in view of findings by Speilberger (1970) and Cattell (1967). Both these authors reported that females consistently

scored higher on anxiety rating questionnaries than males. To analyze any differences T-tests of significance for differences between means were computed for males and females for each training level applicable+. Tables VII, VIII and IX present the results of these three T-tests which do not substantiate the expected differences thus causing the null hypothesis of no differences in trait anxiety of individuals due to sex to not be rejected.

TABLE VII

T-test for Significance of Differences Between Means of Males and Females Training Under Six Hours Per Week.

Measure →	IPAT		EPI		STAI	
Group ↓	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
MALES	145.63	15.76	19.42	8.70	72.21	14.08
FEMALES	153.00	14.58	22.44	8.80	84.22	16.07
Mean Difference	7.3129		3.3889		10.4445	
t =	1.4685		1.1548		2.1646	

A t value of 2.021 needed for significance.

TABLE VIII

T-test for Significance of Differences Between Means of Males and Females Training From Six to Ten Hours Per Week.

+ Note: No females trained more than 15 hours per week.

Measure →	IPAT		EPI		STAI	
Group ↓	X	SD	X	SD	X	SD
Males	143.20	15.36	17.65	8.00	74.60	13.88
Females	145.50	15.89	20.30	9.68	72.30	13.43
Mean diff.	72.700		2.6500		2.300	
t =	0.9554		0.9433		0.5323	

A t value of 2.021 needed for significance

TABLE IX

T-test for Significance of Differences Between Means of Males and Females Training from Eleven to Fifteen Hours Per Week.

Measure →	IPAT		EPI		STAI	
Group ↓	X	SD	X	SD	X	SD
Males	145.33	15.29	18.88	8.29	74.16	13.99
Females	146.20	21.37	21.00	9.55	77.50	19.44
Mean Diff.	30.5812		2.1250		0.3438	
T =	0.9267		0.6326		0.0510	

A t value of 2.021 needed for significance.

Table X presents the reliability and correlation coefficients of the three measures or instruments used in the study. None of the correlations in this study, either test-retest or between test were as high as published coefficients. This was considered acceptable, however, in view of the larger sample sizes used in the published correlations.

Table X

Reliability and Correlation Coefficients of the Three Trait Anxiety Measures.

Test-retest		Between test	
I.P.A.T.	r= .737	E.P.I.:I.P.A.T.	r= .592
E.P.I.	r= .795	E.P.I.:S.T.A.I.	r= .579
S.T.A.I.	r= .755	S.T.A.I.:I.P.A.T.	r= .692

B. DISCUSSION

The expected differences in trait anxiety due to training levels, age or sex did not materialize. Sex differences which consistently have been found to exist in anxiety inventories (Speilberger, 1970) and age which has also been shown to be a factor in anxiety levels (Cattell, 1963) were not found in this study. A possible explanation for the lack of sex differences would be that the changing roll of women in our society plus the abnormal number of female athletes in the sample caused their anxiety levels to be lower than has been reported in previous studies. The lack of age differences could be due to the sample population which allowed only a small segment (17-25) of the total normal age range. The small sample size could also have been a factor in this area.

Both the test-retest and inter-test correlations of this study were not as high as published correlations. The length of the trait anxiety questionnaire used in the study (117 items) was seen as one possible cause. The questionnaire took considerably longer to complete than any of the three inventories alone. Many of the subjects complained of the tediousness of having to complete it a second time. Such an attitude may have had an effect on the validity of their responses and so the lack of significance in the results. The use of all three inventories was felt to be beneficial in adequately measuring trait anxiety. This is noticeable when comparing the correlations of the three tests (Table X). The E.P.I. which showed the highest test-retest reliability in this study correlated lower with the other two tests than their correlation between each other.

The I.P.A.T., Self Analysis Form, which had the lowest test-retest reliability had higher correlations with each of the other two yet perhaps was not as valid in terms of trait anxiety while the most valid test was the least reliable. The Speilberger S.T.A.I. was intermediary between the two. In examining the reliability and validity of the three inventories it becomes evident that using all three is more valid and more reliable than any single one of them. Perhaps a solution to the problem of length in using all three inventories would be to run an item analysis on the total responses and from this construct a new and shorter questionnaire using only the best and most relevant items from all three inventories. This new questionnaire could also be made sport and physical activity specific.

A further possible drawback to the inventories used has been suggested by Martens (1971). Trait anxiety inventories purport to be non-sensitive to state anxiety or stressful situations. However, in his review of anxiety studies, Martens reports instances where it appears this may not be true. If this is so then it is possible that the stress of athletic participation could have caused the anxiety levels of the high training males, who were almost exclusively on athletic teams, to be higher than they would be in a normal situation.

In addition, the sample population of university students and athletes may have had an effect on the results. Cattell (1963) reports that university students, both male and female, are not a normal population in terms of anxiety. An ideal sample population would be one with a large range and normal distribution in physical

activity levels, low levels of stress, and selected from the normal population at large.

CHAPTER FIVE

SUMMARY

The problem examined by this exploratory study was is there a relationship between an individuals' trait anxiety level, a supposedly stable personality factor and that individuals' level of structured physical activity. On the basis of A.N.S. and anxiety research with Wenger's studies being the most notable, and A.N.S. and physical activity research which is best exemplified by Hahner and Rochelle's study it was hypothesized that there might be a relationship between the trait anxiety levels and physical activity levels.

The questionnaire used in this study to determine trait anxiety levels consisted of three highly validated inventories. The length (117 items) possibly might have been a problem in terms of conscientiousness of responses but an examination of the test-retest and intertest correlations revealed that to adequately measure trait anxiety all three inventories should be used. It was also felt that the trait anxiety inventories may have been sensitive to state anxiety as reported by Martens (1971), and so caused elevations in the scores of the high trainers who were exposed to stress situations in intercollegiate athletics.

The conclusions that must be drawn from this study is that as of yet there is no basis to assume there is a relationship between trait anxiety and amounts of structured physical activity. However, it should be noted that this is an exploratory study and its findings should not be taken as conclusive.

Some brief recommendations for future research in this area would be:

(a) Keep all questionnaires etc. anonymous to minimize any threats to the ego of the subjects.

(b) Utilize a longitudinal study with physical fitness and anxiety testing at the beginning and end of the study to detect any changes during the study.

(c) Draw the subjects from a normal population which has no complicating factors such as stress due to athletics etc.

(d) Keep the testing sessions as short as possible. This might be accomplished by sectioning the questionnaire and giving it out in six sessions rather than two.

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APPENDIX

TRAIT ANXIETY QUESTIONNAIRE

INSTRUCTIONS:

This questionnaire is made up of three inventories which supposedly measure the same thing.

The total number of items is 117 and it should take between 15 - 20 minutes to complete the whole inventory.

The first part contains 57 questions with either a yes or no answer. The yes response will correspond with the one (1) column on the answer sheet and the no with the (2) two column.

The second part contains 40 questions and although they are numbered 1 - 40 on the questionnaire please answer them on the answer sheet in the rows from 61 - 100. Part two has a choice of three answers. Please use the one (1) column for the first selection given (i.e. true, yes, etc.), the two (2) column for the second choice (i.e. In Between, uncertain, etc.), and the three (3) column for the best choice (i.e. no, false, etc.).

Part three has 20 questions and please mark the answers in order from row 101 to row 120. This section has four answers per question. Again please mark the answer sheet in the appropriate column, (i.e. 1 for almost never, 2 for sometimes, 3 for often and the 4th column for almost always).

Thank you very much for your cooperation.

		1	2
1.	Do you often long for excitement?	YES	NO
2.	Do you often need understanding friends to cheer you up?	YES	NO
3.	Are you usually carefree?	YES	NO
4.	Do you find it very hard to take no for an answer?	YES	NO
5.	Do you stop and think things over before doing anything?	YES	NO
6.	If you say you will do something do you always keep your promise, no matter how inconvenient it might be to do so?	YES	NO
7.	Does you mood often go up and down?	YES	NO
8.	Do you generally do and say things quickly without stopping to think?	YES	NO
9.	Do you ever feel "just miserable" for no good reason?	YES	NO
10.	Would you do almost anything for a dare?	YES	NO
11.	Do you suddenly feel shy when you want to talk to an attractive stranger?	YES	NO
12.	Once in a while do you lose your temper and get angry?	YES	NO
13.	Do you often do things on the spur of the moment?	YES	NO
14.	Do you often worry about things you should not have done or said?	YES	NO
15.	Generally do you prefer reading to meeting people?	YES	NO
16.	Are your feelings rather easily hurt?	YES	NO
17.	Do you like going out alot?	YES	NO
18.	Do you occasionally have thoughts and ideas that you would not like other people to know about?	YES	NO
19.	Are you sometimes bubbling over with energy and sometimes very sluggish?	YES	NO
20.	Do you prefer to have few but special friends?	YES	NO
21.	Do you daydream a lot?	YES	NO
22.	When people shout at you, do you shout back?	YES	NO
23.	Are you often troubled about feelings of guilt?	YES	NO
24.	Are all your habits good and desirable ones?	YES	NO

		1	2
25.	Can you usually let yourself go and enjoy yourself a lot at a gay party?	YES	NO
26.	Would you call yourself tense or "highly strung"?	YES	NO
27.	Do other people think of you as being very lively?	YES	NO
28.	After you have done something important, do you often come away feeling you could have done better?	YES	NO
29.	Are you mostly quiet when you are with other people?	YES	NO
30.	Do you sometimes gossip?	YES	NO
31.	Do ideas run through your head so that you cannot sleep?	YES	NO
32.	If there is something you want to know about, would you rather look it up in a book than talk to someone about it?	YES	NO
33.	Do you get palpitations or thumping in your heart?	YES	NO
34.	Do you like the kind of work that you need to pay close attention to?	YES	NO
35.	Do you get attacks of shaking or trembling?	YES	NO
36.	Would you always declare everything at the customs, even if you knew that you could never be found out?	YES	NO
37.	Do you hate being with a crowd who play jokes on one another?	YES	NO
38.	Are you an irritable person?	YES	NO
39.	Do you like doing things in which you have to act quickly?	YES	NO
40.	Do you worry about awful things that might happen?	YES	NO
41.	Are you slow and unhurried in the way you move?	YES	NO
42.	Have you ever been late for an appointment or work?	YES	NO
43.	Do you have any nightmares?	YES	NO
44.	Do you like talking to people so much that you would never miss a chance of talking to a stranger?	YES	NO
45.	Are you troubled by aches and pains?	YES	NO
46.	Would you be very happy if you could not see lots of people most of the time?	YES	NO

		1	2
47.	Would you call yourself a nervous person?	YES	NO
48.	Of all the people you know are there some whom you definately do not like?	YES	NO
49.	Would you say you were fairly self-confident?	YES	NO
50.	Are you easily hurt when people find fault with you or your work?	YES	NO
51.	Do you find it hard to really enjoy yourself at a lively party?	YES	NO
52.	Are you troubled with feelings of inferiority?	YES	NO
53.	Can you easily get some life into a rather dull party?	YES	NO
54.	Do you sometimes talk about things you know nothing about?	YES	NO
55.	Do you worry about your health?	YES	NO
56.	Do you like playing pranks on others?	YES	NO
57.	Do you suffer from sleeplessness?	YES	NO

	1	2	3
1. I find that my interests, in people and amusements, tend to change fairly rapidly	True	In Between	False
2. If people think poorly of me I can still go on quite serenely in my own mind	True	In Between	False
3. I like to wait till I am sure that what I am saying is correct before I put forward an argument	Yes	In Between	No
4. I am inclined to let my actions get swayed by feelings of jealousy	Sometimes	Seldom	Never
5. If I had my life to live over again I would: (a) plan very differently (b) want it the same	(a)	In Between	(b)
6. I admire my parents in all important matters	Yes	In Between	No
7. I find it hard to "take 'no' for an answer", even when I know what I ask is impossible	True	In Between	False
8. In demanding and enforcing obedience my parents (or guardians) were: (a) always very reasonable (b) often unreasonable	True	In Between	False
9. I need my friends more than they seem to need me	Rarely	Sometimes	Often
10. I doubt the honesty of people who are more friendly than I would naturally expect them to be	True	In Between	False
11. I feel sure that I could "pull myself together" to deal with an emergency	Always	Often	Seldom
12. As a child I was afraid of the dark	Often	Sometimes	Never
13. People sometimes tell me that I show my excitement in vioce and manner too obviously	Yes	Uncertain	No
14. If people take advantage of my friendliness I: (a) soon forget and forgive (b) resent it and hold it against them	(a)	In Between	(b)
15. I find myself upset rather than helped by the kind of personal criticism that many people make	Often	Occasionally	Never

	1	2	3
16. Often I get angry with people too quickly	True	In Between	False
17. I feel restless as if I want something but do not know what	Very Rarely	Sometimes	Often
18. I sometimes doubt whether people I am talking to are really interested in what I am saying	True	In Between	False
19. I have always been free from any vague feelings of ill-health such as obscure pains, digestive upsets, awareness of heart action, etc.	True	Uncertain	False
20. In discussion with some people, I get so annoyed that I can hardly trust myself to speak	Sometimes	Rarely	Never
21. Through getting tense I use up more energy than most people in getting things done.	True	Uncertain	False
22. I make a point of not being absent-minded or forgetful of details	True	Uncertain	False
23. However difficult and unpleasant the obstacles, I always stick to my original intentions	Yes	In Between	No
24. I tend to get over-excited and "rattled" in upsetting situations	Yes	In Between	No
25. I occasionally have vivid dreams that disturb my sleep	Yes	In Between	No
26. I always have enough energy when faced with difficulties	Yes	In Between	No
27. I sometimes feel compelled to count things for no particular purpose	Yes	In Between	No
28. Most people are a little queer mentally, though they do not like to admit it	True	Uncertain	False
29. If I make an awkward social mistake, I can soon forget it	Yes	In Between	No
30. I feel grouchy and just do not want to see people: (a) occasionally (b) rather often	(a)	In Between	(b)

		1	2	3
31.	I am brought almost to tears by having things go wrong	Never	Very Rarely	Sometimes
32.	In the midst of social groups I am nevertheless sometimes overcome by feelings of lineliness and worth - lessness	Yes	In Between	No
33.	I wake in the night and through worry have some difficulty in sleeping again	Often	Sometimes	Never
34.	My spirits generally stay high no matter how many troubles I meet	Yes	In Between	No
35.	I sometimes get feelings of guilt or remorse over quite small matters	Yes	In Between	No
36.	My nerves get on edge so that certain sounds, eg. a screechy hinge, are unbearable and give me the shivers	Often	Sometimes	Never
37.	If something badly upsets me I generally calm down again quite quickly	True	Uncertain	False
38.	I tend to tremble or perspire when I think of difficult tasks ahead	Yes	In Between	No
39.	I usually fall asleep quickly, in a few minutes, when I go to bed	Yes	In Between	No
40.	I sometimes get in a state of tension or turmoil as I think over my recent concerns and interests	True	Uncertain	False

YOUR SELF-EVALUATION QUESTIONNAIRE

HOW DO YOU GENERALLY FEEL

NAME _____ NUMBER OF YEARS IN COMPETITION _____ ANY PREVIOUS ATHLETIC INJURY (DESCRIBE)_____

SPORT _____ AGE _____

DIRECTIONS: Mark the answer which seems to describe your general feelings best.

1. I feel pleasant	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
2. I tire quickly	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
3. I feel like crying	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
4. I wish I could be as happy as others seem to be	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
5. I am losing out on things because I can't make up my mind soon enough	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
6. I feel rested	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
7. I am "calm, cool and collected"	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
8. I feel that difficulties are piling up so that I cannot overcome them	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
9. I worry too much over something that really doesn't matter	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
10. I am happy	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
11. I am inclined to take things hard	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
12. I lack self-confidence	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
13. I feel secure	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
14. I try to avoid facing a crisis or difficulty	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
15. I feel blue	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
16. I am content	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
17. Some unimportant thought runs through my mind and bothers me	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
18. I take disappointments so keenly that I can't put them out of my mind	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
19. I am a steady person	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
20. I get in a state of tension or turmoil as I think over my recent concerns and interests	ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS

DATA SHEET

This study is being done to try and determine if a person's trait anxiety, a supposedly stable characteristic, can change due to a continuous schedule of structured physical activity such as the training for an intercollegiate team.

No individual scores will be studied. Only group scores will be involved (unless at the request of the individual). Please fill out the Data Sheet fully and as accurately as possible.

AGE:

SEX:

EDUCATIONAL LEVEL & FACULTY:

PRESENT INVOLVEMENT IN SPORT (ATHLETICS) ☐ YES ☐ NO

If Yes (a) How many Hours per Week
(b) For how Many Years
(c) Any Awards
1. Provincial
2. National
3. International

PAST INVOLVEMENT IN SPORT (ATHLETICS)
(If Not Involved at Present) YES NO

If Yes (a) How many Hours per Week
(b) How many Years ago
(c) For How Long
(d) Awards
1. Provincial
2. National
3. International